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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit: 2814

Examiner: Mr. Nathan W. Ha

#13/Response  
7/16/03  
C. Pini

In re PATENT APPLICATION of:

Applicant(s) : Makoto Terui

Serial No. : 10/022,268

Filed : December 20, 2001

For : SEMICONDUCTOR PACKAGE AND  
METHOD OF FABRICATING SAME

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Sir:

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) **RESPONSE**  
) **AFTER FINAL**  
) **REJECTION**  
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This is responsive to the Office Action of April 14, 2003, the period for reply to which has been set to expire on July 14, 2003.

The withdrawal of the rejection for new matter, by the Advisory Action dated May 19, 2003, is noted with satisfaction. However, the claims remain rejected for obviousness on the basis of Orcutt in view of Akram et al (hereafter simply "Akram"). For the reasons discussed below, though, it is respectfully submitted that the inventions defined by the independent claims are patentable over these references.

In **independent claim 9**, steps (a) and (e) refer to a lead frame that has a protrusion. Similarly, steps (b) and (c) of **independent claim 18** refer to a lead frame having a protrusion. The Office Action acknowledges that Orcutt does not disclose such a protrusion. However, at the middle of page 3 the Office Action takes the position that Akram:

"discloses an analogous semiconductor packaging with a lead frame 12A with a protrusion 48 with an acute angle. This protrusion is provided to make a better electrical contact between the substrate and the solder ball since it increases the contact surface area."

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Later, in the "Response to Arguments" section, the Office Action takes the position that Akram's "substrate 12 can be used as a frame since it carries electrical conductors on the surface, for example, element 32B..."

Applicants respectfully disagree. The term "lead frame" is well known in the semiconductor packaging art. The term refers to a metal frame that is used to hold leads in place while a chip is encapsulated, and is then trimmed to disconnect the leads from one another. An ordinarily skilled person would not consider Akram's substrate 12 to be a lead frame. Instead, it is part of a connection arrangement (see Akram's Figure 1) for testing semiconductors after the leads have been attached and wired to the chip. It should be noted that the solder ball 16 shown in Akram's Figure 5 is already connected to the pad 19 of Akram's component 18 *before* the component 18 is tested using Akram's interconnection arrangement.

As was noted above, the Office Action takes the position that Akram's protrusion is provided to make better electrical contact between the substrate and the solder ball since it increases the contact surface area. However, there is no evidence of record that poor electrical contact between solder balls and the leads of a lead frame has ever been recognized as a problem in the semiconductor packaging art. Consequently, there is no reason why an ordinarily skilled person would have been motivated to increase the contact surface area between solder balls and leads of a lead frame.

**Independent claim 12** refers to a locally roughened face in steps (a), (e), and in a final "wherein" clause. Neither reference discloses or suggests a lead frame with a locally roughened face that is pressed against a terminal.

**Independent claim 14** recites the step of "absorbing air existing between said substantially spherical terminal and said bottom of said cavity" via a hole in a first mold die "to urge said substantially spherical terminal against the inner side of said cavity." Similarly, **independent claim 15** recites "exposing a bottom portion of said substantially spherical terminal to reduced pressure via said through hole in the bottom of the cavity so as to urge said substantially spherical terminal against an inner wall of said cavity." At the bottom of page 3, the Office Action comments that Akram's Figure 7F shows a throughhole 40 in the substrate. The Office Action then states, "this throughhole is used

to inject or suck out air, gas, or liquid pressure in the cavity," and takes the position that it would have been obvious to use Akram's throughhole in Orcutt's arrangement in order to take full advantage. The trouble with this position is that Akram only teaches injecting a substance **into** a cavity using a throughhole (see paragraph [0084] of the Akram reference, for example) and the purpose of this is to exert an upward force on the bottom side of the cavity (see paragraphs [0066] and [0067] of the reference). There is no hint in the reference of using Akram's throughhole 40 to suck air, gas, or liquid **out** of the cavity.

Applicants renew their argument that Akram is in a non-analogous art and that an ordinarily skilled person in the semiconductor packaging art should not be presumed to know that the Akram reference even exists. At the bottom of page 4, the Office Action comments that Akram teaches a semiconductor package. The fact remains, though, that the Akram reference itself advises that it "relates generally to semiconductor testing..." [see paragraph [0002]]. The mere fact that a packaged semiconductor appears in the Akram reference would not be enough to attract the attention of a person who is ordinarily skilled in the semiconductor packaging art. It is well known that packaged semiconductors are used in the radar art, the radio art, the computer art, and many other arts. An ordinarily skilled person who wanted to make an improvement in semiconductor packaging would have had no more reason to refer to the semiconductor testing art than to all these other arts that involve packaged semiconductor devices.

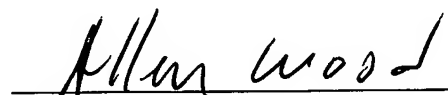
For the foregoing reasons, it is respectfully submitted that the application is in condition for allowance. Reconsideration of the application is therefore respectfully requested.

Respectfully submitted,

June 23, 2003

Date

AW:tlc



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